

Body weights of 98 species of Andean cloud-forest birds

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Avian body masses have been compiled for many species of the world (Dunning 1993), but data for many Neotropical species are still lacking or sample sizes are small. Bird weights from several countries in north-western South America are available (Ecuador: King 1991, Rahbek *et al.* 1993; Venezuela: Thomas 1982, 1990 and references therein; and Colombia: Burton 1973, 1975, Oniki & Willis 1991). Additional compilations of such basic information are still broadly useful since body mass may be strongly correlated with life-history traits such as longevity and reproduction (Newton 1998, Vuilleumier 1999), and because weights may be convenient surrogates for ecological and evolutionary variables such as abundance, dispersion and geographical distribution (Marini *et al.* 1997, Gaston & Blackburn 2000). This paper presents body weights for 2,634 individuals of 98 species of Andean cloud-forest birds, from the western slope of the Eastern Cordillera of Colombia.

Data and study sites

From January 1998 to December 2000, birds were mist-netted within forest for two consecutive days per month, at each of four sites. Birds caught were measured for morphometric data and weighed using an electronic balance (Ohaus®) to the nearest 0.1 g. The sex of most individuals was determined either via laparotomy or by noting sexually dimorphic traits in the case of hummingbirds. Furcular subcutaneous fat deposits were checked in the field and noted as categories (none=no fat, some=traces, medium=almost covered, high=completely covered and more).

All four sites surveyed are in dpto. Cundinamarca, c.15 km west and 20 km north-west of Bogotá city: (1) Finca San Cayetano, Vereda Fute, municipio Bojacá (04°38'N, 74°19'W), 2,700 m, forest patch c.800 ha; (2) Finca El Silencio, Vereda El Remanso, municipio de Bojacá (04°37'N, 74°19'W), 2,750 m, forest patch c.15 ha; (3) Finca Miralejos, Vereda Pueblo Viejo, municipio Zipacón (04°46'N, 74°24'W), 2,850 m, forest patch c.5 ha; and (4) Finca La Selva, between Vereda La Selva and Tribuna, municipio de Facatativá (04°52'N, 74°23'W), 2,850 m, forest patch c.2,000 ha.

In this region, remnant cloud-forest fragments, including the four surveyed, occur within a matrix of intensively farmed areas at the western border of the

Sabana de Bogotá. The area is part of a larger tract of forest that continues southwest and north for c.50 km along the ridge of the Bogotá plateau. Forests of different size, slope and degree of disturbance vary from large tracts of fairly undisturbed remnants to small-forest fragments amongst pastures. Vegetation is similar in general structure and consists of large trees with a mean height of 15 m and dense undergrowth, although some places show a discontinuous canopy with signs of recent human and cattle disturbance. Trees and shrubs of the families Asteraceae (*Ageratina* spp., *Erato* spp. and *Eupatorium* spp.), Winteraceae (mostly *Drimis* spp.) and Melastomataceae (*Miconia* spp., *Tibuchina lepidota*, *Bucquetia* spp. and *Clidemia* spp.) are dominant. Rubiaceae (mostly *Palicourea* spp.), Ericaceae (*Macleania rupestris*) and Melastomataceae (*Miconia* spp.) dominate the understorey, with some Orchidaceae (*Pleurotalis* spp. and *Epidendron* spp.) and Araceae (*Anturium* spp.) at all sites.

Table 1 summarises weight data for each species analysed separately for the sexes (F=female, M=male, U=undetermined). The latter category primarily comprises individuals for which gonads could not be seen during laparotomies. A *t*-Test ($\alpha=0.05$) was performed for those species in which the combined categories of female and male were equal or more than 20 samples. If no differences were found, they were lumped and tested against the Undetermined category. In all cases (25 species), no statistical differences were found in either of the two steps. We include this combined result under each species as combined category (C). If data were available for <4 individuals of a given sex, the table includes the weights for each individual, rather than the mean. When >3 individuals were measured, the table reports the mean, standard deviation, range, and first and third quartiles. We included quartiles because these metrics help identify if the distribution of weights for each category is symmetrical. When an egg was evident in the oviduct, females were not included to obtain the mean, standard deviation or quartiles. The weight of such females is presented separately as F*. Since accounted subcutaneous fat deposits did not correspond to individuals with more weight or vice versa, results were not separated by this characteristic. Taxonomy follows Remsen *et al.* (2006).

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TABLE 1
 Body masses (g) of Andean cloud-forest birds. Entries based on a sample size of three or fewer individuals report individual weights.

Species	Sex (n)	Mean ± SD (range)	First quartile	Third quartile
<i>Accipiter striatus</i>	U (3)	95.2, 102.2, 110.4		
<i>Patagioenas (Columba) fasciata</i>	F (1)	250.0		
	U (1)	262.3		
<i>Megascops (Otus) albogularis</i>	F (1)	166.2		
	M (1)	171.4		
<i>Glauclidium jardinii</i>	U (23)	158.5 ± 12.3 (136.6–180.9)	150.9	165.0
	F (3)	68.7, 60.7, 54.6		
	M (7)	62.2 ± 7.3 (54.9–77.4)	58.3	63.1
<i>Asio stygius</i>	U (12)	66.9 ± 7.3 (53.6–79.5)	62.5	70.7
	U (1)	408.0		
<i>Aegolius harrisi</i>	F (2)	118.9, 129.4		
	M (1)	124.2		
<i>Caprimulgus longirostris</i>	U (1)	120.9		
	F (4)	44.7 ± 5.1 (39.6–51.4)	41.4	47.3
	M (4)	44.7 ± 2.5 (42.2–48.1)	43.2	45.8
<i>Doryfera ludovicica</i>	U (1)	42.0		
	M (1)	6.0		
<i>Colibri thalassinus</i>	U (17)	6.0 ± 0.3 (5.1–6.1)	5.4	5.8
	U (12)	4.8 ± 0.4 (4.2–5.6)	4.6	5.1
<i>Colibri coruscans</i>	F (1)	6.0		
	M (1)	5.8		
	U (16)	6.7 ± 1.0 (3.8–8.3)	6.4	7.1
<i>Adelomyia melanogenys</i>	U (1)	3.5		
<i>Heliodoxa rubinoides</i>	F (1)	7.5		
<i>Lafresnaya lafresnayi</i>	F (27)	5.1 ± 0.3 (4.5–5.5)	4.9	5.3
	M (6)	5.3 ± 0.2 (5.0–5.5)	5.3	5.5
	U (1)	5.2		
<i>Coeligena prunellei</i>	C (24)	5.1 ± 0.3 (4.5–5.5)	5.2	5.4
	U (1)	6.4		
<i>Coeligena torquata</i>	F (6)	6.2 ± 0.7 (5.1–6.9)	5.8	6.8
	M (32)	7.3 ± 1.3 (3.8–12.9)	6.8	7.8
<i>Coeligena bonapartei</i>	U (1)	7.1	7.1	
	C (39)	7.1 ± 1.3 (3.8–12.9)	7.0	7.5
	F (94)	6.4 ± 0.6 (3.3–8.5)	6.1	6.6
	M (124)	6.6 ± 0.6 (5.3–10.1)	6.3	6.8
	U (6)	6.5 ± 0.5 (6.0–7.0)	6.0	6.9
<i>Ensifera ensifera</i>	C (224)	6.5 ± 0.6 (3.3–10.1)	6.4	6.7
	M (2)	10.4, 10.0		
<i>Boissonneaua flavescens</i>	U (3)	10.9, 10.2, 10.1		
	U (12)	8.2 ± 0.4 (7.3–8.8)	8.0	8.5
<i>Heliangelus exortis</i>	F (28)	4.4 ± 0.3 (4.0–5.2)	4.2	4.6
	M (115)	4.8 ± 0.6 (3.5–8.5)	4.5	5.0

	U (4)	4.5 ± 0.5 (3.9–5.2)	4.2	4.8
	C (147)	4.7 ± 0.6 (3.5–8.5)	4.7	5.0
<i>Eriocnemis vestita</i>	F (37)	4.6 ± 0.3 (3.6–5.3)	4.5	4.8
	M (43)	4.8 ± 0.6 (3.3–7.2)	4.5	4.9
	U (7)	4.9 ± 0.4 (4.1–5.2)	4.7	5.2
	C (87)	4.7 ± 0.5 (3.3–7.2)	4.6	4.9
<i>Eriocnemis cupreovertris</i>	F (1)	4.4		
	U (13)	5.3 ± 0.3 (4.7–5.8)	5.2	5.4
<i>Ocreatus underwoodii</i>	F (3)	3.1, 2.7, 2.7		
	M (2)	2.5, 2.7		
	U (1)	3.0		
<i>Lesbia nuna</i>	F (2)	3.1, 3.9		
	M (1)	3.5		
<i>Metallura tyrianthina</i>	F (25)	3.3 ± 0.3 (2.8–4.2)	3.1	3.4
	M (27)	3.5 ± 0.4 (2.9–4.8)	3.3	3.5
	C (52)	3.4 ± 0.4 (2.8–4.8)	3.3	3.5
<i>Aglaiocercus kingi</i>	M (2)	5.6, 5.1		
<i>Aulacorhynchus prasinus</i>	F (5)	157.4 ± 8.5 (145.1–166.1)	153.7	164.2
	M (9)	148.8 ± 11.5 (134.8–169.6)	142.5	152.0
	U (7)	157.0 ± 13.3 (142.6–176.0)	147.4	165.4
<i>Piculus rivolii</i>	F (1)	113.2		
	M (1)	109.5		
	U (1)	117.2		
<i>Veniliornis fumigatus</i>	F (1)	43.3		
	M (8)	41.5 ± 1.8 (39.3–44.3)	39.7	42.5
<i>Dendrocincla tyrannina</i>	M (1)	47.2		
<i>Xiphocolaptes promeropirhynchus</i>	F (2)	109.4, 121.7		
	M (1)	102.9		
	U (7)	118.7 ± 7.4 (108.2–126.5)	114.0	124.0
<i>Lepidocolaptes lacrymiger (affinis)</i>	F (4)	34.8 ± 4.7 (29.5–40.9)	32.7	36.5
	M (6)	35.0 ± 5.1 (30.4–43.7)	32.2	37.2
	U (2)	33.7, 36.2		
<i>Synallaxis unirufa</i>	F (21)	17.9 ± 2.4 (15.2–27.6)	16.9	18.3
	M (16)	17.9 ± 1.1 (15.6–20.2)	17.4	18.4
	U (32)	17.9 ± 2.1 (16.9–26.4)	17.0	17.9
	C (69)	17.9 ± 2.0 (15.3–27.6)	17.8	18.3
<i>Hellmayrea gularis</i>	M (1)	12.8		
<i>Margarornis squamiger</i>	F (6)	18.9 ± 3.5 (16.0–25.8)	17.1	18.7
	M (2)	17.8, 18.7		
	U (3)	17.6, 19.0, 22.0		
<i>Premnoplex brunnescens</i>	U (1)	13.4		
<i>Pseudocolaptes boissonneautii</i>	F (5)	44.0 ± 4.4 (39.1–50.8)	41.6	45.1
	M (5)	45.0 ± 4.6 (41.0–51.6)	41.4	47.9
	U (6)	42.9 ± 2.6 (40.9–47.5)	41.3	43.7
<i>Syndactyla subalaris</i>	F (1)	27.5		
<i>Thripadectes holostictus</i>	F (8)	40.8 ± 2.4 (38.4–45.6)	39.1	41.9
	M (15)	40.5 ± 3.5 (32.6–45.3)	39.3	42.8
	U (5)	41.1 ± 2.8 (37.7–44.6)	39.0	42.7
	C (28)	40.7 ± 3.0 (32.6–45.6)	40.7	42.5

<i>Grallaria squamigera</i>	F (1)	129.1		
<i>Grallaria ruficapilla</i>	F (3)	79.1 ± 2.8 (76.4–81.9)	77.7	80.5
	F*	85.6		
	M (2)	76.3, 89.8		
	U (2)	69.9, 87.6		
<i>Grallaricula nana</i>	F (3)	19.3, 20.0, 20.1		
	M (5)	19.4 ± 0.9 (18.3–20.3)	15.3	20.3
<i>Scytalopus griseicollis</i>	M (2)	21.8, 19.6		
<i>Scytalopus unicolor</i>	F (8)	16.8 ± 1.6 (15.3–19.0)	15.5	17.9
	M (6)	18.5 ± 0.8 (17.6–19.3)	17.9	19.1
	U (4)	18.4 ± 2.3 (16.1–20.3)	16.6	20.3
<i>Ampelion rubrocristatus</i>	M (1)	61.3		
<i>Pipreola riefferii</i>	F (5)	48.9 ± 3.0 (44.2–52.0)	47.7	50.6
	M (3)	49.8, 49.9, 54.0		
	U (1)	46.9		
<i>Phyllomyias nigrocapillus</i>	F (3)	9.9, 8.9, 8.9		
	M (8)	9.4 ± 0.3 (9.0–9.8)	9.1	9.7
	U (6)	9.9 ± 0.6 (8.8–10.4)	9.6	10.4
<i>Elaenia frantzii</i>	F (1)	10.9		
	M (3)	16.3, 15.8, 14.7		
<i>Mecocerculus leucophrys</i>	F (19)	11.6 ± 1.1 (9.9–14.0)	10.9	12.4
	F*	14.6		
	M (11)	12.1 ± 1.4 (9.6–14.5)	11.5	12.9
	U (12)	11.6 ± 1.3 (9.6–13.9)	10.5	12.4
	C (42)	11.7 ± 1.2 (9.6–14.5)	11.7	12.5
<i>Anairetes agilis</i>	F (2)	11.7, 10.4		
	M (1)	11.3		
	U (4)	9.3 ± 2.1 (6.2–10.9)	8.5	10.7
<i>Myiophobus pulcher</i>	M (2)	10.0, 9.5		
<i>Pyrrhomyias cinnamomeus</i>	U (1)	9.3		
<i>Empidonax traillii</i>	U (1)	14.9		
<i>Ochthoeca diadema</i>	F (13)	10.9 ± 1.0 (9.0–12.6)	10.4	11.9
	M (29)	11.6 ± 0.8 (9.5–12.8)	11.0	12.2
	U (30)	11.3 ± 0.8 (9.7–12.8)	10.6	12.0
	C (72)	11.4 ± 0.9 (9.0–12.8)	11.6	12.0
<i>Myiotheretes fumigatus</i>	M (4)	33.0 ± 1.3 (31.6–34.6)	32.1	34.1
	U (1)	34.6		
<i>Cinnycerthia unirufa</i>	F (36)	29.8 ± 2.9 (24.1–36.8)	27.9	31.3
	M (76)	31.0 ± 2.6 (24.4–36.2)	29.4	32.8
	U (81)	29.4 ± 2.7 (23.0–36.9)	27.9	30.8
	C (193)	30.1 ± 2.8 (23.0–36.9)	30.0	31.6
<i>Cinnycerthia peruana</i>	F (3)	26.2, 23.0, 22.9		
	U (4)	26.0 ± 1.4 (24.3–27.2)	25.1	27.0
<i>Troglodytes aedon</i>	M (1)	9.9		
<i>Troglodytes solstitialis</i>	F (2)	12.4, 11.0		
	M (1)	11.3		
	U (1)	10.8		
<i>Henicorhina leucophrys</i>	F (7)	16.2 ± 0.6 (15.6–17.1)	15.8	16.5
	M (25)	17.1 ± 0.9 (15.2–18.8)	16.6	17.7

	U (16)	16.6 ± 0.9 (14.9–18.2)	16.1	17.1
	C (48)	16.8 ± 0.9 (14.9–18.8)	16.7	17.2
<i>Catharus ustulatus</i>	F (2)	26.9, 27.5		
	U (14)	29.6 ± 4.0 (22.4–36.5)	28.6	32.3
<i>Turdus fuscater</i>	M (1)	138.1		
	U (3)	140.5, 141.3, 168.8		
<i>Vireo olivaceus</i>	M (1)	14.1		
<i>Amblycercus holosericeus</i>	M (2)	44.3, 45.2		
	U (1)	46.8		
<i>Dendroica fusca</i>	F (2)	8.9, 9.0		
	M (1)	10.1		
	U (3)	9.0, 9.6, 10.0		
<i>Myioborus ornatus</i>	F (2)	11.8, 12.2		
	M (4)	11.4 ± 0.7 (10.8–12.3)	11.0	11.8
	U (6)	11.8 ± 0.9 (10.8–13.1)	11.2	12.4
<i>Basileuterus luteoviridis</i>	F (3)	13.5, 12.8, 13.4		
	M (2)	13.8, 15.0		
	U (5)	14.9 ± 1.3 (13.3–16.6)	13.9	15.8
<i>Basileuterus nigrocristatus</i>	F (19)	13.2 ± 1.0 (11.1–15.6)	12.6	13.5
	F*	19.4		
	M (45)	14.0 ± 1.0 (11.8–16.6)	13.2	14.5
	U (15)	14.9 ± 2.4 (11.7–19.8)	12.8	16.5
	C (79)	13.9 ± 1.4 (11.1–19.8)	13.7	14.6
<i>Basileuterus coronatus</i>	F (7)	16.4 ± 1.5 (15.2–18.6)	15.5	17.4
	M (14)	17.5 ± 1.6 (14.2–19.7)	16.5	18.8
	U (9)	17.0 ± 1.8 (14.4–19.9)	15.7	18.1
	C (30)	17.1 ± 1.7 (14.2–19.9)	16.9	18.6
<i>Conirostrum sitticolor</i>	F (3)	11.2, 11.2, 11.9		
	M (3)	11.8, 11.8, 13.7		
	U (3)	9.6, 11.3, 14.2		
<i>Conirostrum albifrons</i>	F (2)	13.3, 11.7		
	M (1)	13.0		
<i>Diglossa caeruleascens</i>	F (12)	14.3 ± 1.1 (12.9–15.6)	13.3	15.3
	M (23)	14.6 ± 0.6 (13.5–15.8)	14.4	15.0
	U (27)	14.5 ± 0.8 (13.1–16.2)	14.0	15.2
	C (62)	14.5 ± 0.8 (12.9–16.2)	14.5	15.1
<i>Diglossa cyanea</i>	F (23)	16.7 ± 1.0 (15.4–19.0)	15.9	17.2
	M (51)	17.4 ± 1.1 (14.9–19.6)	16.9	17.9
	U (31)	16.7 ± 1.1 (14.8–19.1)	16.1	17.2
	C (105)	17.0 ± 1.1 (14.8–19.6)	17.0	17.7
<i>Diglossa humeralis</i>	F (4)	13.0 ± 0.6 (12.4–13.6)	12.6	13.4
	M (11)	13.3 ± 1.0 (12.0–15.4)	13.0	13.9
	U (5)	12.4 ± 1.0 (11.1–13.3)	11.7	13.2
<i>Diglossa albilatera</i>	F (87)	9.5 ± 0.8 (8.0–11.4)	9.0	10.0
	F*	12.6		
	M (118)	10.2 ± 0.8 (8.5–12.7)	9.7	10.6
	U (22)	9.5 ± 0.6 (8.4–10.6)	9.0	10.1
	C (227)	9.9 ± 0.8 (8.0–12.7)	9.8	10.4
<i>Pipraeidea melanonota</i>	F (1)	18.1		

<i>Tangara nigroviridis</i>	F (2)	16.1, 16.3		
	U (1)	16.5		
<i>Tangara vassorii</i>	F (4)	18.4 ± 0.6 (17.6–18.8)	18.4	18.7
	M (22)	17.5 ± 0.8 (16.1–18.9)	16.9	17.8
	U (7)	17.0 ± 1.1 (15.6–18.6)	16.2	17.7
	C (33)	17.5 ± 0.9 (15.6–18.9)	17.6	18.0
<i>Anisognathus igniventris</i>	F (13)	36.4 ± 2.6 (33.4–41.0)	34.2	38.9
	F*	43.7		
	M (41)	37.1 ± 2.0 (32.6–41.6)	34.3	39.1
	U (20)	36.9 ± 2.3 (28.6–40.4)	36.0	38.4
	C (74)	36.8 ± 2.3 (28.6–41.6)	37.3	38.4
<i>Buthraupis eximia</i>	F (1)	53.9		
	M (1)	47.3		
<i>Dubusia taeniata</i>	F (3)	34.8, 40.3, 44.5		
	M (8)	40.3 ± 1.8 (37.9–42.0)	38.4	41.9
	U (2)	38.6, 40.3		
<i>Thraupis cyanocephala</i>	F (4)	35.4 ± 3.2 (31.7–38.2)	33.3	38.0
	M (4)	33.3 ± 0.4 (32.7–33.6)	33.2	33.5
	U (1)	34.6		
<i>Chlorospingus ophthalmicus flavopectus</i>	F (45)	22.1 ± 1.7 (19.5–26.7)	21.0	22.5
	M (68)	24.4 ± 2.1 (19.1–28.4)	23.1	25.8
	U (31)	22.5 ± 1.8 (19.4–25.5)	21.1	24.0
	C (144)	23.2 ± 2.2 (19.1–28.4)	23.2	24.8
<i>Hemispingus atropileus</i>	F (15)	23.5 ± 2.5 (20.3–30.7)	22.2	23.9
	M (21)	21.5 ± 1.7 (17.7–24.3)	21.5	23.2
	U (5)	21.2 ± 1.0 (21.1–23.7)	21.2	22.1
	C (41)	22.6 ± 2.1 (17.7–30.7)	21.5	23.5
<i>Hemispingus superciliaris</i>	F (1)	13.9		
	M (6)	18.0 ± 4.6 (13.7–23.9)	14.9	21.8
	U (4)	15.5 ± 1.7 (13.0–16.6)	15.3	16.3
<i>Hemispingus melanotis</i>	F (12)	18.9 ± 1.6 (16.8–21.2)	17.6	20.4
	M (21)	18.6 ± 1.8 (12.8–20.9)	18.2	19.7
	U (7)	18.7 ± 1.3 (16.9–20.8)	18.0	19.3
	C (40)	18.7 ± 1.6 (12.8–21.2)	18.8	19.7
<i>Hemispingus verticalis</i>	M (1)	14.1		
	U (2)	15.4, 15.7		
<i>Cnemoscopus rubrirostris</i>	F (1)	21.2		
<i>Chlorornis riefferii</i>	F (5)	51.6 ± 3.6 (45.5–54.7)	45.5	51.5
	M (12)	54.2 ± 2.9 (50.1–59.7)	54.3	52.3
	U (2)	52.9, 52		
<i>Catamblyrhynchus diadema</i>	M (3)	15.0, 16.8, 16.9		
<i>Pheucticus aureoventris</i>	F (1)	58.4		
	M (6)	61.9 ± 3.8 (55.4–66.2)	60.5	64.1
<i>Atlapetes pallidimucha</i>	F (6)	33.1 ± 4.9 (24.9–38.3)	32.0	36.8
	M (19)	36.1 ± 4.2 (21.4–40.2)	35.7	38.6
	U (6)	35.7 ± 1.4 (34.4–38.1)	34.7	36.0
	C (31)	35.4 ± 4.0 (21.4–40.2)	36.1	38.1
<i>Atlapetes albofrenatus</i>	U (1)	27.9		
<i>Atlapetes schistaceus</i>	F (32)	29.5 ± 2.8 (25.5–38.8)	28.1	30.8

	M (86)	29.9 ± 2.7 (22.6–43.9)	28.6	30.7
	U (22)	29.5 ± 2.3 (26.1–35.5)	27.8	30.9
	C (140)	29.8 ± 2.6 (22.6–43.9)	29.4	30.7
<i>Buarremon (Atlapetes) brunneinucha</i>	M (6)	45.0 ± 0.7 (44.1–45.7)	44.5	45.5
<i>Buarremon (Atlapetes) torquatus</i>	F (16)	40.9 ± 3.1 (35.9–45.3)	38.3	43.0
	M (47)	40.5 ± 2.9 (32.2–44.9)	39.8	42.1
	U (5)	41.5 ± 3.4 (35.9–44.5)	41.0	43.9
	C (68)	40.7 ± 2.9 (32.2–44.3)	41.2	42.5
<i>Haplospiza rustica</i>	F (6)	15.9 ± 1.0 (14.4–17.1)	15.3	16.5
	M (1)	15.5		
	U (1)	15.3		
<i>Zonotrichia capensis</i>	F (2)	19.2, 19.9		
	M (6)	21.6 ± 1.1 (16.9–22.9)	21.4	22.2
<i>Carduelis (Spinus) spinescens</i>	U (1)	11.3		

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